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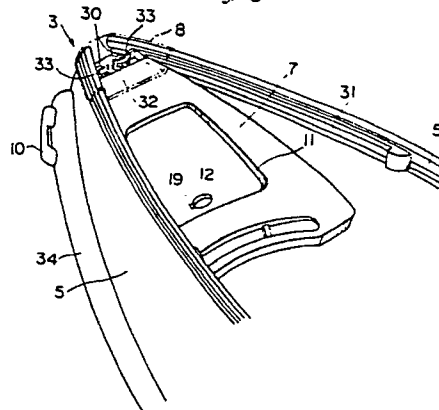
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PORTABLE FOLDING BOAT.

A portable folding boat consisting of a blow molded body composed mainly of a flexible synthetic resin and left and right broadsides (5), (5) which can be opened to vertical positions and folded to the original positions. The retainer members (33) provided at the ends of the broadsides (5), (5) are provided with rectangular bores (32), and the locking projections (30) of a support plate (7) are inserted through and engaged with these bores (32) to hold the support plate (7). When the support plate (7) is to be removed, it can be positioned in the vicinity of the bow (3) and the stern (4) so that the support plate (7) does not move. A mast support unit is provided at that part of the support plate (7) which is on the side of the bow (3) or at the central portion of

a bottom shell (2) of a boat body (1) so that the boat can be both sailed and rowed.

Fig. 9



Portable Collapsible Boat

Field of the Invention

This invention relates to a portable collapsible boat sides of which can be folded or unfolded on a bottom, and more particularly to a boat which has improved structure to maintain unfolded condition of a bow and a stern and has a removable sailing equipment.

Background of the Invention

Referring to USP 3,987,887, as one of example of conventional collapsible boats, right and left sides of the boat can be folded on a bottom of the boat and also can be unfolded back to form a shape of boat. And the boat has a beam, which also serves seats for occupants, to retain the above mentioned unfolded condition.

The body, an appearance of which is a spindle-shaped as a whole, and having oval cross section, is made of flexible synthetic resins, by blow molding. Right and left sides of the boat is made of flexible material so that it can be folded onto the bottom and it can be unfolded from the bottom. A projection is provided at an each inner side of right and left sides of the boat. The beam is installed between the projections so that it can retain unfolded condition of the sides. The boat represents spindle-shaped hollow form when the sides are folded on the bottom so that the beam can be housed inside a boat.

In the conventional collapsible type boat, the beam and the body are not firmly linked. So the beam may tend to move to a different position from the set position by vibration caused moving or so. Such the movement makes extremely difficult to maintain proper housing condition. Further in the conventional collapsible type boat, setting up sides up from the collapsed condition is not so easy. Because the beam must firstly be taken out from inside the body, then, maintaining the complete unfolded condition of the sides, the beam should be housed between the projection. Thus there remains a problem to solve for smooth operation.

And the conventional collapsible boat is structured to sail with use of owls, and cannot move by using sails.

There is also disadvantage in the conventional collapsible boat in that the bow easily rises above the surface of water due to its light body weight when sailing by using an outboard motor in comparative high speed. Such disadvantage may occurs when an occupant is seated at the stern or occupant's baggages and other installments are positioned in improper manner.

Additional disadvantage is that the beam, serving as seats, is fixed at a determined position which causes certain inconvenience that occupants cannot move its seating position in order to balance the body, otherwise the occupant is forced to remain in a half-sitting position after moving as there will be no beam to be sit at the moved position.

And although some other installments, such as owls, can be housed together with the beam within a body. But such installments may not be housed in a stable condition as the housed position of the beam cannot be set at any fixed position.

Disclosure of the Invention

The object of this invention is to provide a portable collapsible boat in which a supporting plate instead of the conventional beam is provided at the bow and the stern of the boat to be caught between the sides for linking the sides with purpose to retain unfolded condition and the supporting plate can be properly housed without taking out from the sides so that smooth assembly can be assured.

A portable collapsible boat of this invention comprising a body in which right and left sides of a boat can be unfolded and folded from and to bottom of boat, and a supporting plate to retain such unfolded condition which body is made of flexible synthetic resin to be formed a hollow blow-molded, and the said supporting plate is provided at the both ends of the right and left sides of a boat and can be removed; between the ends of the right and left sides of the boat where a supporting plate is provided, retaining equipment having long hole towards straight line along the side of a boat located rectangularly against the sides is provided, and a pair of hooked projection is provided at the ends of the above sides of the supporting plate, and a supporting plate is retained by inserted the projection to hook the said long hole.

Accordingly, the supporting plate and the body is connected firmly to be positioned in a stable condition so that the supporting plate can be housed in a fixed manner without being effected by vibration during move and transfer, which assures smooth transfer from collapsed condition to unfolded condition.

Fixed positioning of the supporting plate within a body also results in proper installment of the boat equipments such as owls.

This invention provides also a mast supporting equipment, which enables sailing with and without owls. The mast supporting equipment is provided a hole to insert the mast at the supporting plate of the bow and is also provided a mast supporting equipment at the bottom of the body straight down from the above-mentioned hole. By easily handling of the mast, one can enjoy sailing without any difficulty in unfolding and folding in this type fo portable collapsible boat.

The mast supporting equipment comprises of a supporting body, having a hole to insert the lower ends of the above mast at its top, which is half-sphere shaped and positioned upside down at the bottom of a boat, and a plurality of installment pieces screwed at the bottom of a boat.

This makes the mast easy to be inserted and screwed to rotate freely according to sailing operation.

The supporting plate and the mast supporting equipment provide respectively notches at the opening ends of the hole. The mast provides projection shaped in such a condition as to go through the notch of the mast supporting equipment the mast, and the above projection of the upper end of the mast can be positioned to be hooked at the opening end of the hole.

A portable collapsible boat in this invention can also be provided a pair of floats each formed differently from the body and the floats can be screwed with the outer side of the body. Thus the floats can be separated from the body when transporting.

Also, at the time of installment of the above float with the body, a long hole to insert a center board is formed between the body and the float, which eliminates installment of a hole for insertion of center board at the bottom of the body.

Further sailing condition can be stabled under high speed when an outboard motor is used with light body weight by providing flat-shaped stabilizer between the ends of the floats.

If ridge shaped projections to receive a seat plate is provided at the corresponding position of the sides can easily moved to balance the boat. When the both ends of seat plate is made as trapezoid form, position of owls can be changed according to the position of seat. The seat can serve as slide-proof by providing a plurality of concave and convex at both side ends which increase friction with inner surface of the sides.

An equipment to support a mast can also installed at the center of right and left sides of a boat when a bottom is unfolded.

Brief Description of Drawings

Fig. 1 shows a perspective view of a portable collapsible boat as a preferred embodiment of this invention, in which a mast is setup and sails are hoisted;

Fig. 2 is a side view of the fig. 1;

Fig. 3 is a plan view of the boat without a mast and sail shown in Fig. 1;

Fig. 4 is a general view of folded condition of Fig.3;

Fig. 5 is an enlarged view partially sectioned showing the mast provided at the supporting plate;

Fig. 6 is an enlarged cross section of supporting part of the mast in Fig. 5;

Fig. 7 is an enlarged plan view of mast supporting equipment;

Fig. 8 is an enlarged cross section of supporting installment taking along the line VIII-VIII;

Fig. 9 shows a condition in which a supporting plate is taken out frame position in Fig. 4;

Fig. 10 is an enlarged view showing an edge of a body of Fig. 9;

Fig. 11A and 11B are views showing a supporting plate housed in a body upon closing a bow;

Fig. 12 is a cross section of an unfolded condition of the body;

Fig. 13 is a cross section of a folded condition of the body;

Fig. 14 is an enlarged views of seats;

Fig. 15 is a plan view in which seats in Fig. 13 are provided at the projection of the body;

Fig. 16 is an enlarged partial view showing a rudder, a chiller and an outboard motor are provided on the supporting plate of the stern;

Fig. 17 shows a stabilizer is provided at the stern side of a float;

Fig. 18 is a plan view of the float;

Fig. 19 is a side view of the float;

Fig. 20 is a cross section taken along the line X-X of the float;

Fig. 21 is an enlarged perspective view showing moving condition of an owl clutch provided at the sides of a boat;

Fig. 22 is a perspective view of mast supporting equipment in the second embodiment of the invention; and

Fig. 23 is a cross section of supporting installment of a mast in Fig. 22.

Description of the Preferred Embodiment

A couple of embodiments will be explained hereafter by referring figures.

The first embodiment of this invention is shown Fig. 1 through Fig. 21.

A body 1 is formed as a single mold with hollow with blow mold made of water-proof flexible synthetic resin, and as seen from Fig. 1 and Fig. 4, shaped as spindle having oval cross section.

An opposite side of a bottom 2 of the body 1 is cut through from a bow 3 till a stern 4 to form a pair of symmetrical sides 5, 5. The pair of symmetrical sides 5, 5, lie at opposite sides through slit 6 by the cut. The body 1 is unfolded by fixing a supporting plate 7 between sides 5, 5 at the end of the bow 3 and the stern 4. The bow portion of the body 1 is cut-off so as to enable to unfold a pair of the sides of 5, 5, as

seen from Fig. 9 and Fig. 10. And covers 8, 8 is provided to prevent a flood of water at the bow 3 and the stern 4. The cover 8 is made of flexible water-proof materials.

A curved connection part 9 between the bottom 2 and the side 5 is thicker than other part of the body 1 in order to have enough force to recover when unfolding the side 5 on the bottom 2. Sides 5, 5 can be unfolded from the slit 6 for left and right direction outwardly and also can be folded onto the upper bottom 2 by its own force of restitution. Curved connection part 9 is thicker than the other part of the body 1 and possess enough durability and flexibility so that repeated use by unfolding and folding does not causes any damage to the boddy 1.

A pair of handle 10 is provided at the bottom 2 of the bow 3 and the stern 4 of the body 1. The handles 10 can be used for moving work and for roping.

The supporting plate 7 is shaped like a trapezoid, and its center portion 11 is formed hollow in a trapezoid-shape. The hollow 11 can house equipment such as ropes. At lower ends adjacent to the hollow 11, a hole 12 provided to insert a mast 13.

The mast 13 is inserted through the hole 12 of the supporting plate 7 to the inner side of a body 1, and its lower end can be retained by the equipment to a mast supporting equipment 14. The mast supporting equipment 14, as referred from the Fig. 5 or 8, consists of supporting body 15 and three fixing pieces 16 to project the supporting body 15.

The supporting body 15 is made of synthetic resin like a body 1, having half sphere-shaped form and its top provides hole 17 to insert lower end of the mast 13. The said hole 17 is positioned straight down the hole 12 of the supporting plate 7 as shown in Fig. 6 and its diameter is approximately the same as hole 12.

At fringe of the hole 17 of the supporting body 15 a notch 20 is provided and also at fringe of the hole 12 of the supporting plate 7 notch 19 is provided to which a projection 18 of the mast 13 can be inserted. The notches 19, 20 are provided to allow to insert lower end of mast 13 having projection 18. The projection 18 of the mast 13 is fixed at fringe of the hole 17 except the portion of the fringe provided the notch 20 of the supporting body 15. Namely after insertion the lower end of mast 13 into the hole 17 of the supporting body 15, then rotated the mast 13 to certain angle, which hooks the projection 18 at fringe of the hole 17 to be positioned firmly. Liner 21 is provided at the inner side of the supporting body 15, which prevents the lower part of mast 13 to touch directly the bottom 2. Thus the mast 13 to rotate freely around its axis.

Three installment pieces 16 of the supporting body 15 are provided to be fixed at the bottom 2 of the boat 1 by bolts 22 and bolt holes 23. Of course bolt holes are also provided at the bottom 2 of the boat 1. The mast support equipment 14 is fixed on

the bottom 2 by bolts 22 which are inserted through packing 24 from outside of the bottom 2 to installment pieces 16. Bolts 22 are fixed by nuts 25.

Rigging equipment of the boat is a particular type which provides a boom 26 and a yard 27 with slight angle at the upper part of the mast 13, between which a jib sail 28 and a main sail 29 are equipped together. Various types of equipment, however, can be used for the boat in this invention.

The supporting plate 7 is also molded by water-proof synthetic resin. Taperzoid shape of the supporting plate 7 is made in such a manner that sides 5, 5 are unfolded and corresponding to its unfolded condition, sides edges are curved. At the side of a bow 3 of the supporting plate 7, a pair of installment hook 30 is provided. (As seen from Fig. 9)

A holder 31 is firmly equipped at the the upper inner edge of each side 5 for receiving the supporting plate 7. The supporting plate 7 is fixed between the holders 31, 31 at the bow 3 and the stern 4, to retain an unfolded condition of sides 5, 5 and to structure deck of the bow 3 and the stern 4.

At the bow side of the holder 31 provided at the bow side (at the stern side of the supporting plate 7 which is provided at the stern side) , retaining hook 33 having long hole 32 along the straight line, which is projecting rectangularly against side 5, is provided. The projection of retaining hook 33 is curved towards the holder 31.

Installment hook 30, 30 of the supporting plate 7 are respectively inserted and hooked within the long hole 32, and the edge of the supporting plate 7 is retained by retaining hooks 33, 33. The opening of long hole 32 is larger than the inserted installment hook 30, which enables supporting plate 7 rotate freely by retained by the retaining hook 33.

The retaining hook 33 rotates when the side 5 is folded to the bottom 2. When it is folded completely, it lies vertically towards the bottom 2 from the side 5, as seen from Figs. 11A and 11B. The supporting plate 7 is thus housed within a space formed by the bottom 2 and the side 5.

Projection 34 is formed at the inner side of sides 5, 5 from the bow 3 to the stern 4, and between projection 34, 34, a seat 35 is extended. The seat 35 is also made of water-proof synthetic resin as the body 1.

The seat 35 is formed to be taperzoid by tapering both ends of a plate as seen from Fig. 14 and 15. At the tapered ends, plurality of concave and convex 36 is formed. The seat 35 is so structured to be moved freely towards the bow 3 or the stern 4 by sliding at the center of the body 1 between projections 34, 34. Where space becomes narrow in sides 5, 5 (seen from the Fig. 15), both ends of concave and

convex 36 are keeping in touch with inner surface of the side 5 to create large friction to keep the position of the seat 35 firm.

At sides 5, 5 of a body 1, floats 37, 37 are provided. Floats 37, 37, having square cross section, are fixed at the projection 39 formed at the outside of the connection part 9 of the body 1. The float 37 is made of resin like body 1 and water and other ballast are contained within to retain balance of light weight body 1.

Concave 40 is formed at the center part from lengthy direction of float 37 at the side body 1. This concave 40 is provided to house a oxygen bomb 41 for skin diving. At the bow 3 of concave 40, long hole 42 is formed to inset center board 43 to project below water then sailing to make leeway of body 1 small. Center board 43 is fixed to clutch 44 at the side 5 for providing owls by rope, and lower part of float 37 provided rib 45 for reinforcing structure i plurality in convexed manner.

The float 37 is formed to hang down when the body 1 is not floated on water, which resulted from a consideration of floating force against the float 37. When the body 1 is floated on water, the float 37 rotates upwardly and retain horizontally.

Between projection 46, 46 provided at stern side of the float 37, a flat stabilizer 47 can be screwed. (Fig. 15) In place of the stabilizer 47, a caster 47a can be provided for convenience when moving or handling on land. (Fig. 4)

At the stern side of the side 5, a base hook 48 is provided from the cover 8. To equip a rudder 49 and a chiller 50, a seat plate 51 is provided at the base hook 48. Also an outboard motor 52 can be provided at seat plate 51.

The seat plate 51 provides a rudder 49 and a block plate 54 for installment of the outboard motor 52 at the stern side of the taperzoid plate 53. Outboard motor 52 is equipped by a hook 55 by retaining the block plate 54. Chiller 50 installed upper end of the rudder 49 projects upward the supporting plate 7 of the body 1 so that it does not intersect the outboard motor 52. For installment of outboard motor, use of well-known hook is recommended. Bolt holes 56... are also formed at three different points at upper ends of the side 5 to change fixing position of clutches 44 which equipment 44b is connected to rotate freely at the base 44a which has U-shaped. Base 44a is fixed at the side 5, and a fix screw 44c is screwed at the bolt hole 56.

The assembly of the boat is as follows. As seen from Fig. 4, body 1 is folded at the beginning. Sides 5, 5 are unfolded, and at that time care must be taken that sides 5, 5 shall not be folded by its own force of restitution by putting seats between. The sides of supporting plate 7 is then provided between holders 31, 31 of the side 5. Force of restitution of the side 5 is received by the supporting plate 7 and thus assembly is completed.

When folding the boat, one can fold the sides 5, 5 to remove the supporting plates 7, 7 from the holders 31, 31 by adding slight force. By removing the supporting plate 7, the side 5 is folded to the bottom 2 by its flexible force of restitution.

An operation to unfold the mast 13 is explained hereafter. The mast 13 is kept as being unfolded, and its lower end is fixed at the hole 12 of the supporting plate 7 to match the projection 18 to the notch 19 to down inside the body 1. The lower end of the mast 13 is fixed at the hole 17 of the mast supporting equipment 14 to match the projection 18 to the notch 19 and to fall down the mast 13, Whereby lower end of the mast 13 reaches above the liner 21, the mast 13 is rotated to remove the projection 18 from the notch 20 to hook the mast 13. Mast 13 is covered by sail or seat beforehand.

Another preferred embodiment will be explained hereinafter referring Fig. 22 and 23.

Mast supporting body 60 consists of base 62 providing supporting tube 61 of the mast 13, and a movable body 64 connected by two bolts 63, 63.

Body 62 provides projections 65a, 65b at both ends of flat plate, and at the center part, supporting tube 61 is provided. The distance between projection 65a and center of a supporting tube 61 equals to that between center of the body 1 and the side 5. Movable body 54 is provided so that space between the projection 65 and a base 62 can be changed. By opening the body 1 to locate the base 62 at the center of the body 1, and rotating the bolt 63 to operate movable body 64 to separate base 62 to make the projection 65a of the base 62 adjacent to the movable body 64 at the sides 5, 5 supporting the tube 61 of the mast 13 is located at the center.

The supporting tube 61 is square-shaped tube, and formed to insert a hole 66. From outer wall to insert the hole 66, three pin holes 67a, 67b, 67c are formed. Pin 68a inserted to the lowest pin hole 67 support lower end of the mast 13, and the mast 13 is fixed by the pins 68b, 68c inserting two pin hole 67b and 67c. At the lower end of the mast 13, holes 69, 69 are formed at the position coincide with the pin holes 67b, 67c.

Operation to set upright the mast 13 is now explained. Pin 68a is firstly inserted to the pin hole 67a at the lowest part of the supporting tube of 61, Mast body 60 is located at the center part of the body 1. Bolt 63 is rotated to separate the movable body 64 from the base 62 to make the projection 65a of the base 62 to the movable body 64 at the sides 5, 5. This enables the supporting tube 61 of the mast 13 locate at the center of the body 1.

The lower end of the mast 13 is inserted into insert the hole 66 of the supporting tube 61, and the pins 68b, 68c are inserted to the pin holes 67b, 67c through the pin holes 69, 69 of the mast 13, and the mast 13 is then fixed and unfolded.

What is claimed is:

1. A portable collapsible boat, comprising of a body in which right and left sides of a boat can be unfolded and folded from and to bottom of boat, and a supporting plate to retain such unfolded condition which body is made of flexible synthetic resin to be formed a hollow blow-molded, and the supporting plate is provided at the both ends of the right and left sides of a boat and can be removed; between the ends of the right and left sides of the boat where a supporting plate is provided, retaining equipment having long hole towards straight line along the side of a boat located rectangularly against the sides is provided, and a pair of hooked projection is provided at the ends of the above sides of the supporting plate, and a supporting plate is retained by inserted the projection to hook the said long hole.
2. A portable collapsible boat, according to claim 1, in which a hole to insert mast is provided at the supporting plate at bow side, and mast supporting equipment is provided to retain lower end of the mast straight down the above hole at the bottom of the boat.
3. A portable collapsible boat, according to claim 2, in which the above mast supporting equipment has a hole to insert the lower end of a mast at its top, comprising of supporting body with half-sphere shape located at the bottom plate, and a plural installing pieces to be screwed and fixed at the bottom of a boat.
4. A portable collapsible boat, according to claim 3, in which the supporting plate and mast supporting equipment provide notches at the opening edge of the above hole correspondingly, and the above mast provides a projection formed to insert the above notch downwards, and hook the above projection at the opening edge of the above hole.
5. A portable collapsible boat, according to claim 1 or 2, in which a float which a pair of floats, which are made separately, are provided at both sides of a boat, and projecting parts of the said body and float are screwed together.
6. A portable collapsible boat, according to claim 5, in which the above float provides a long hole in which center board is inserted to be equipped at the body.

7. A portable collapsible boat, according to claim 5, in which projecting pieces are formed to face each other at the stern sides of the float to extend a flat-shaped stabilizer, and screw holes are provided to install the said stabilizer.
8. A portable collapsible boat, according to claim 7, in which screw holes to install the stabilizer can also be used for installing wheels for transportation.
9. A portable collapsible boat, according to claim 7, in which plural spaces are provided for clutches to hook oars at the upper end of the stern sides.
10. A portable collapsible boat, according to claim 1 or 2, in which the right and the left sides of a boat provide projection to receive flat-shaped sheet plate correspondingly at inner side of a body vertically from bow to stern.
11. A portable collapsible boat, according to claim 10, in which the flat sheet plate is taperzoid-shaped and both sides are tapered.
12. A portable collapsible boat, according to claim 11, in which at the sides of the above sheet plate, plural convex and concaves are provided vertically to increase friction with inner side of stern.
13. A portable collapsible boat, according to claim 1 or 2, a base plate to install rudder at the above supporting plate of the stern side is provided.
14. A portable collapsible boat, according to claim 13, in which the said base plate is set upright to provide sheet plate to house outside equipment.
15. A portable collapsible boat, according to claim 1, in which a removable mast supporting body is provided at the center of left and right side when the bottom is unfolded, and the said mast supporting body comprises a base providing mast supporting cylinder, and movable body at the one end through connecting equipment, and the other edge of the base and outer edge of the above movable body are put between inner side of the right and left side of a boat to position firmly.

Fig. 1

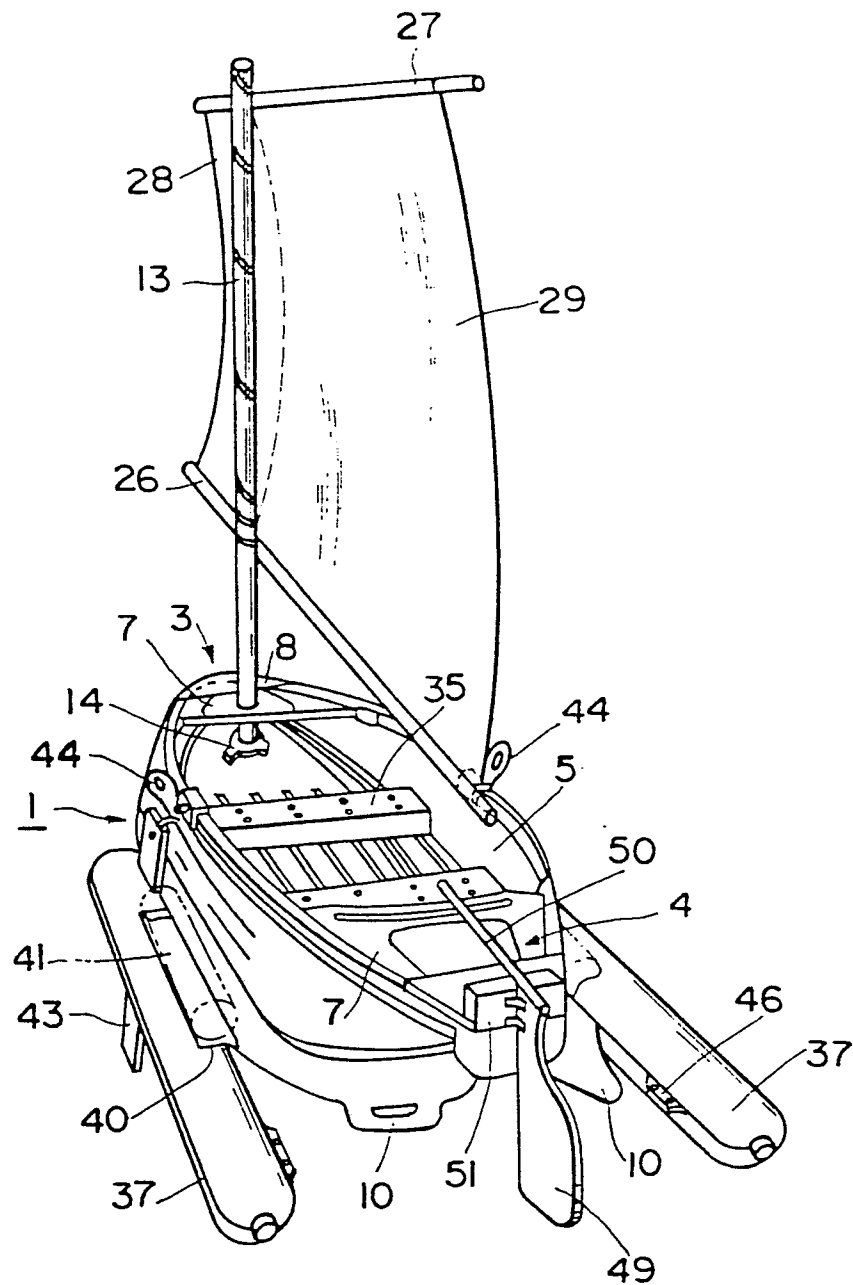


Fig. 2

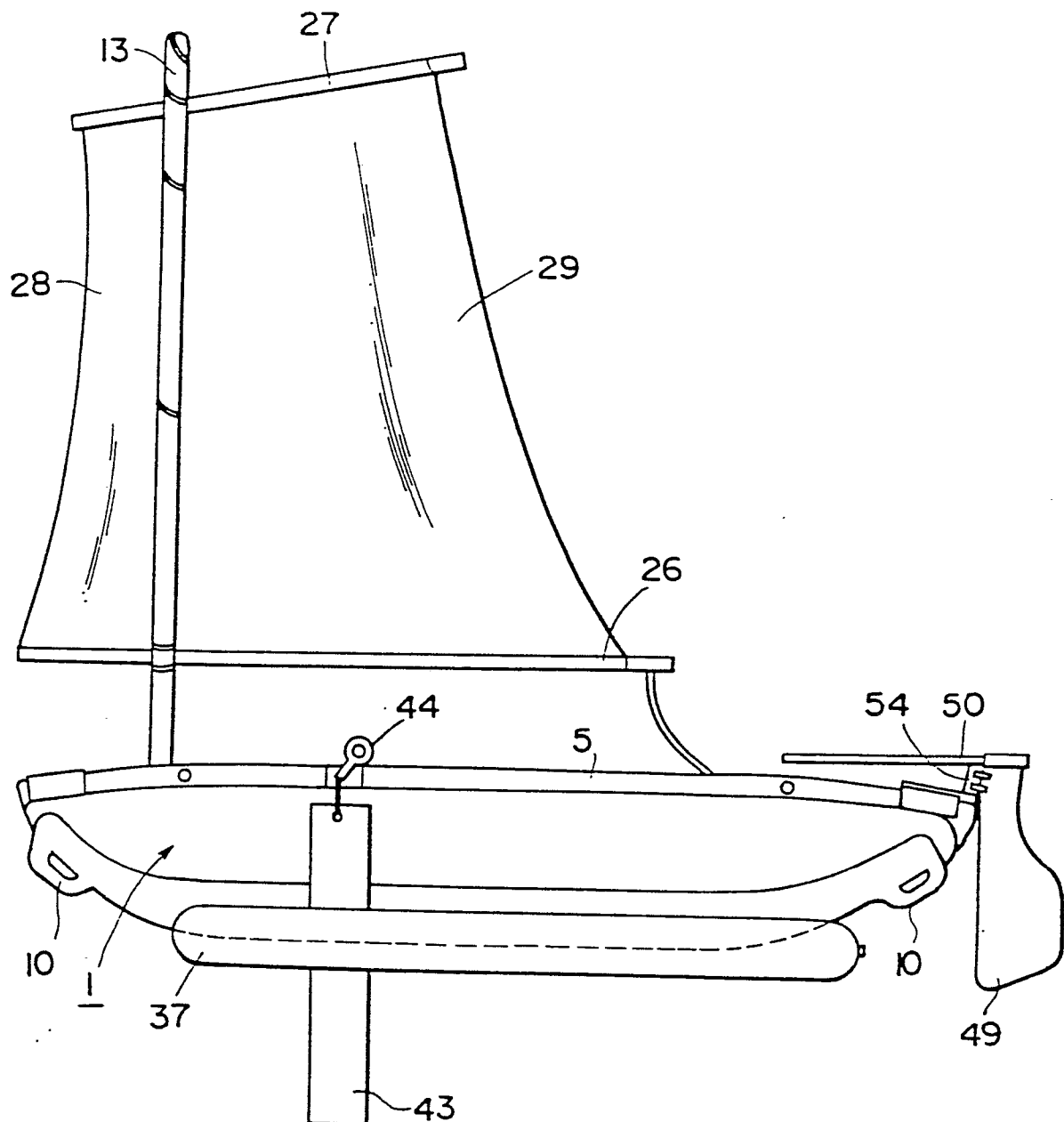


Fig. 3

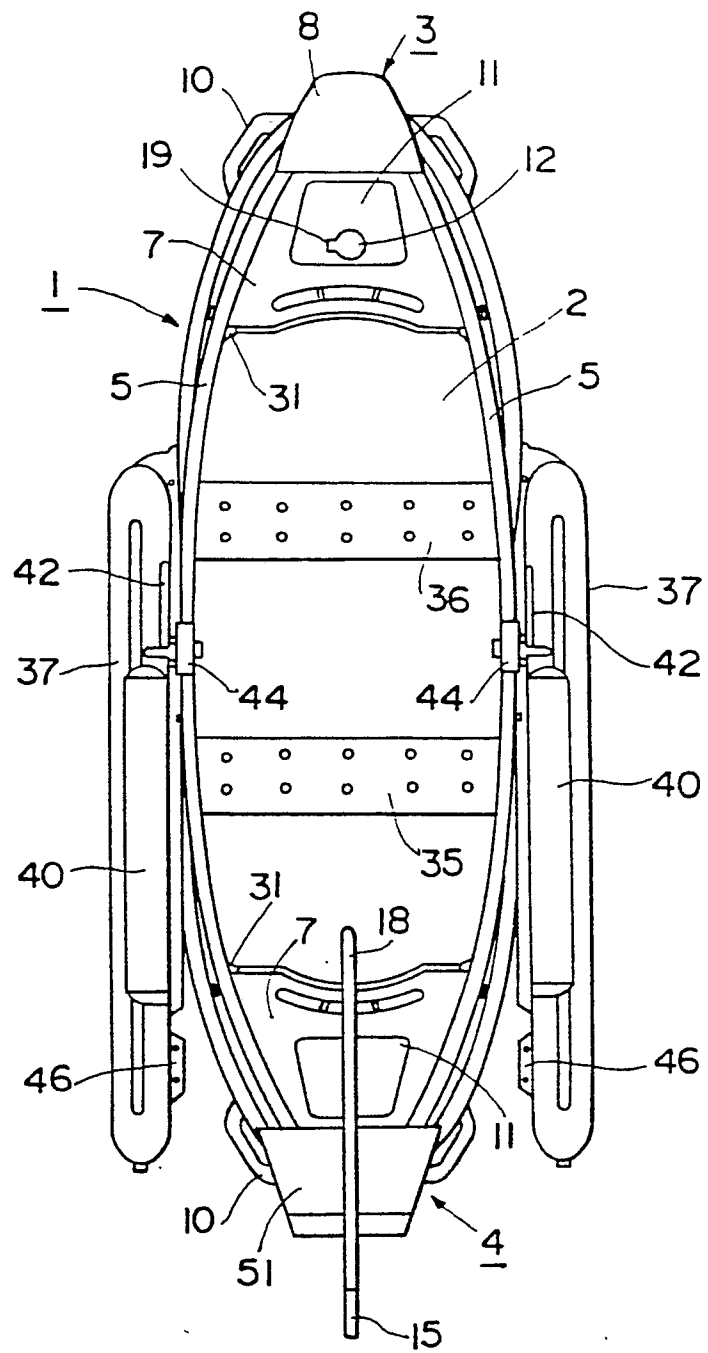


Fig. 4

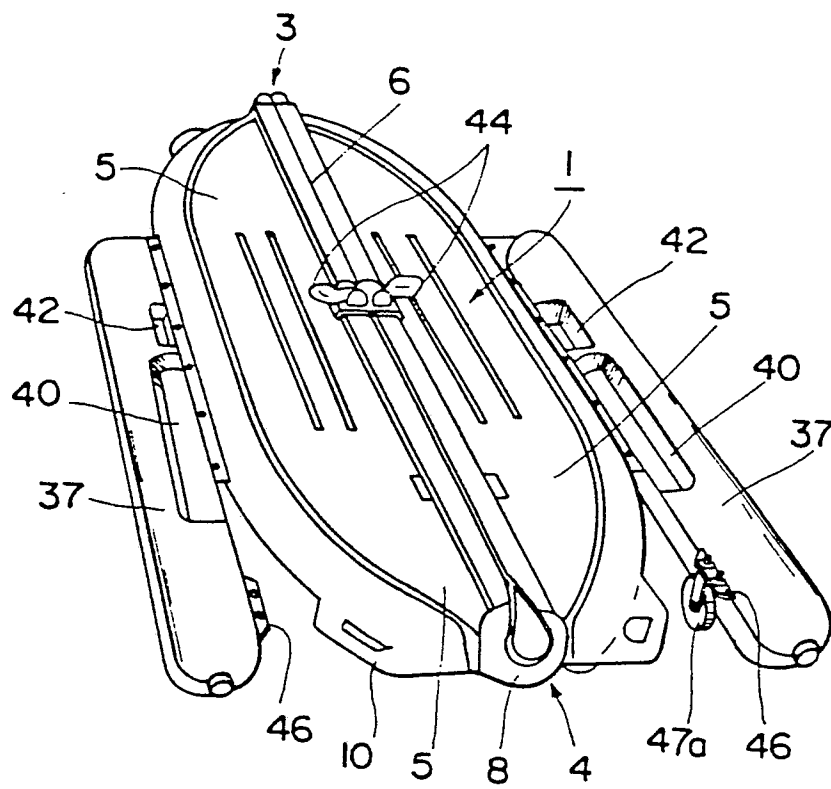


Fig. 5

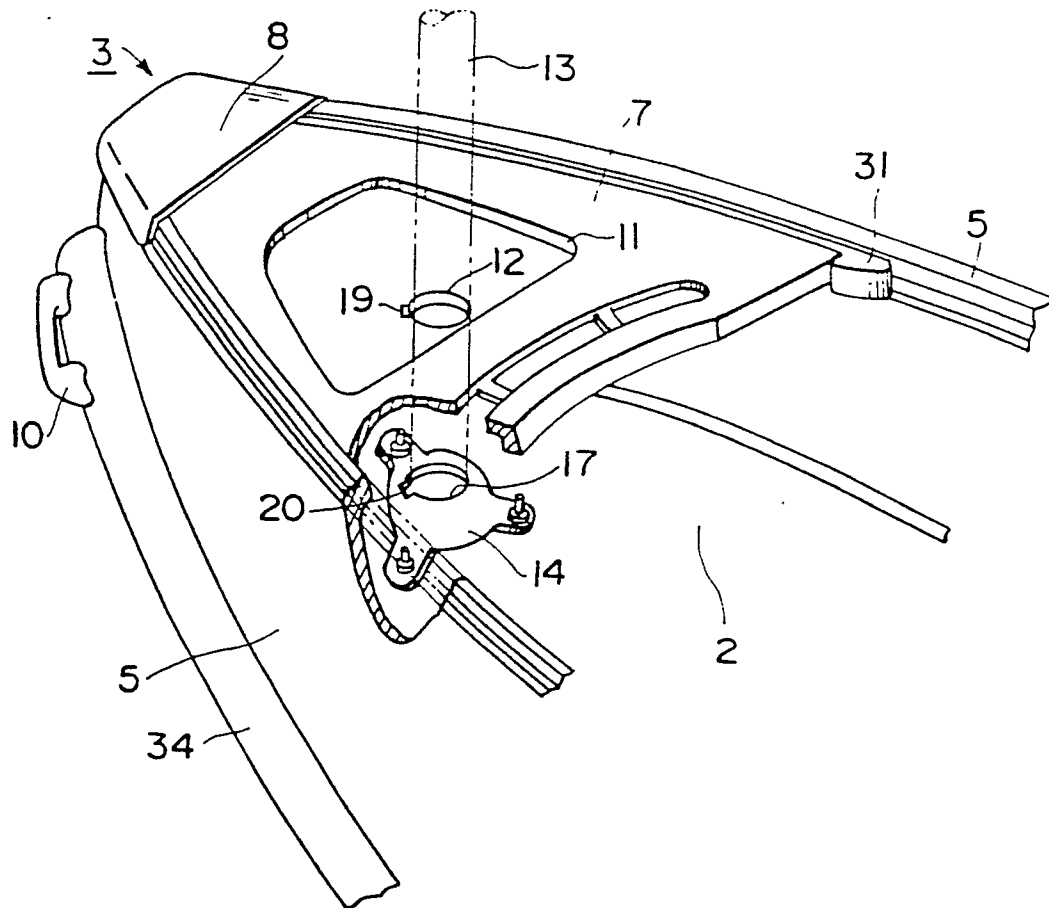


Fig. 6

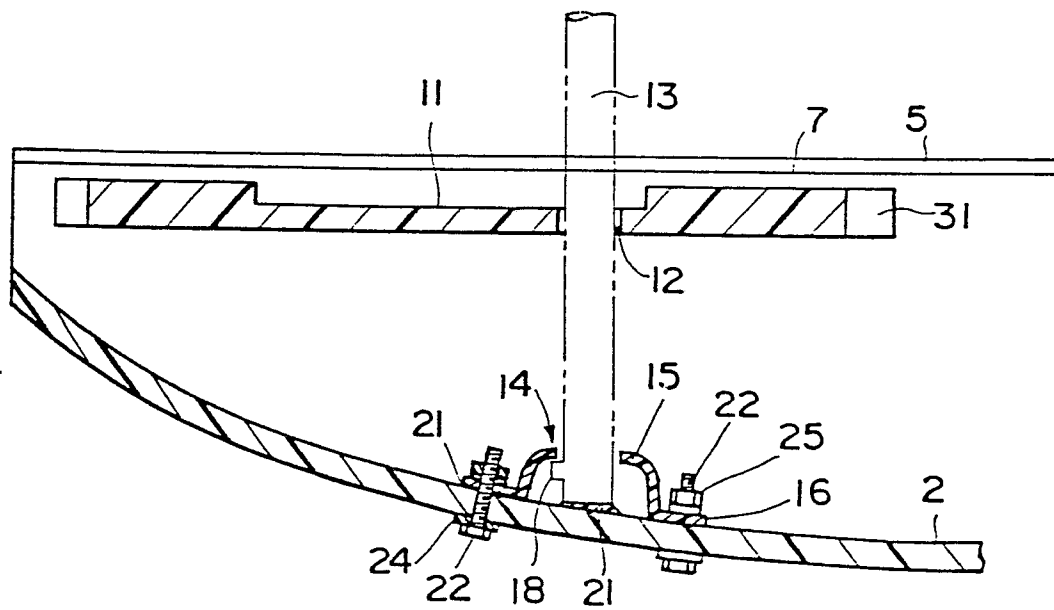


Fig. 7

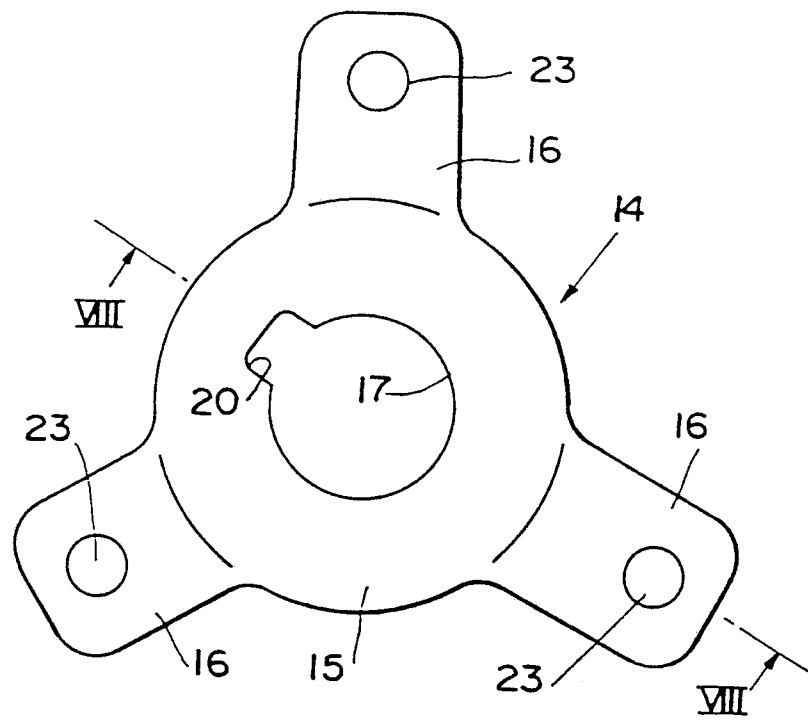


Fig. 8

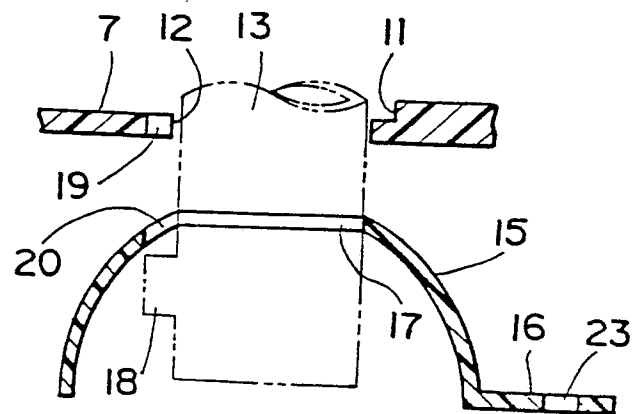


Fig. 9

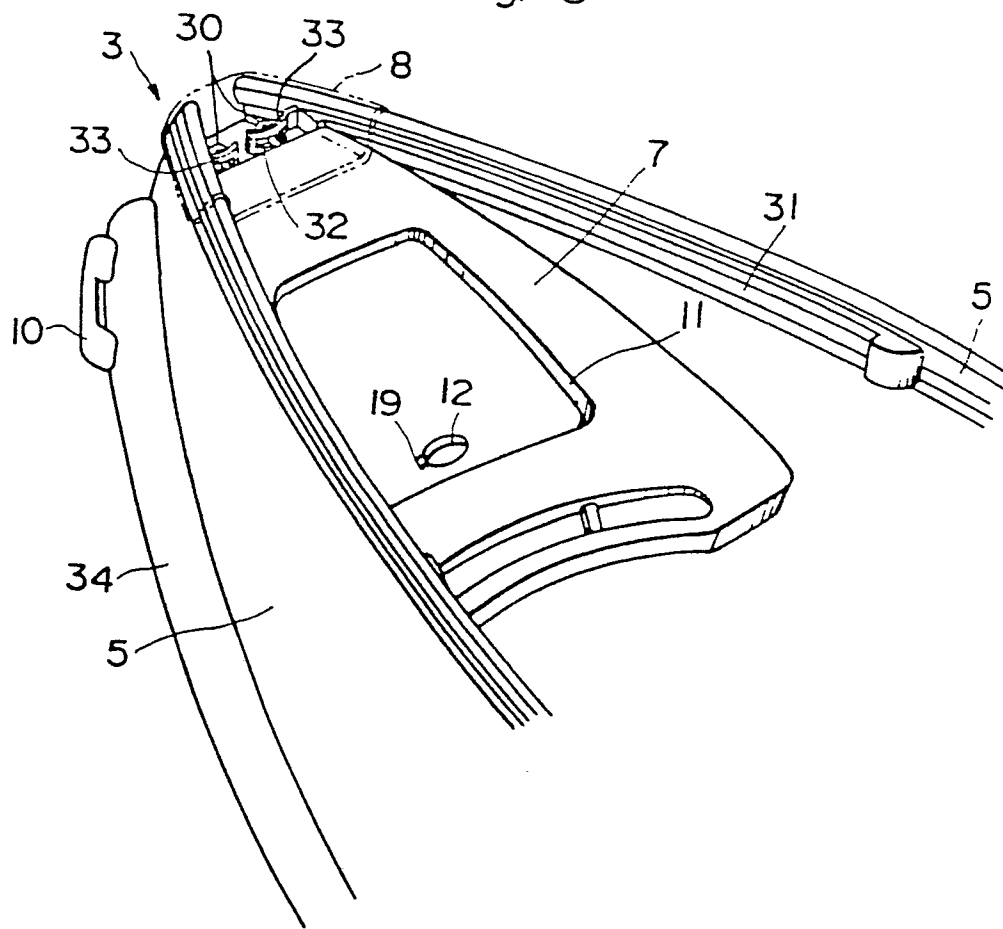


Fig. 10

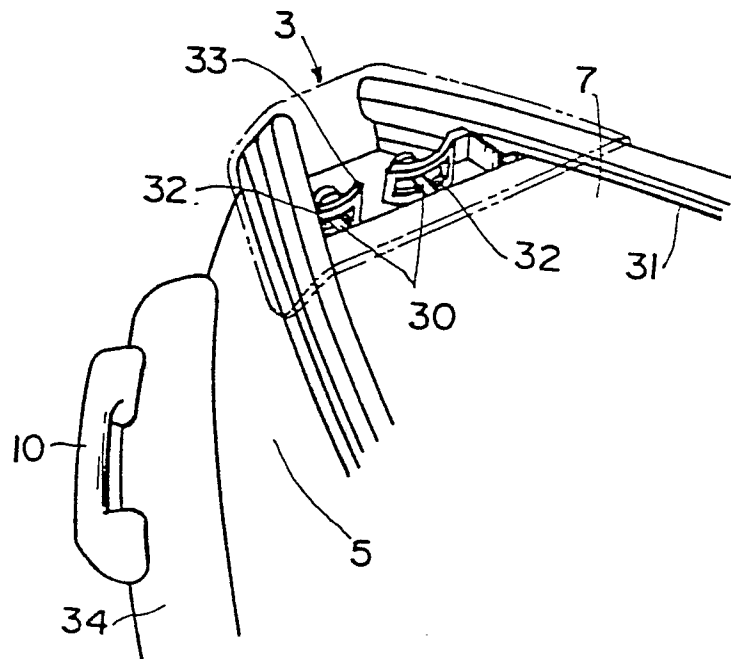


Fig. IIA

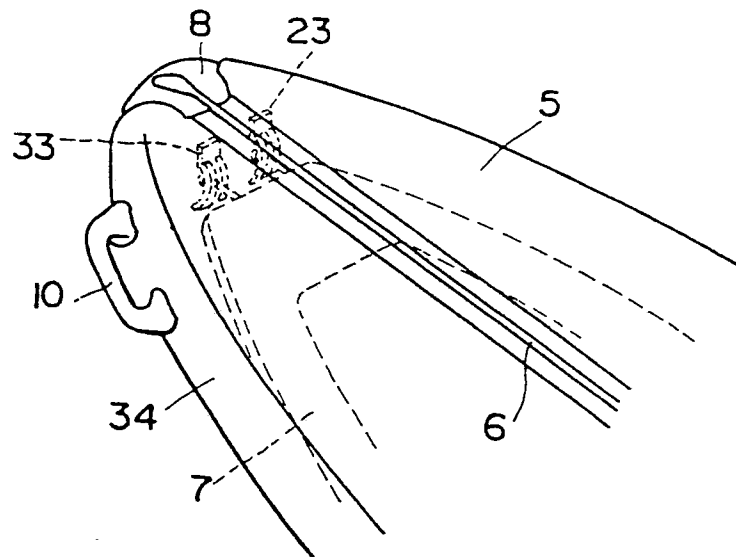


Fig. IIB

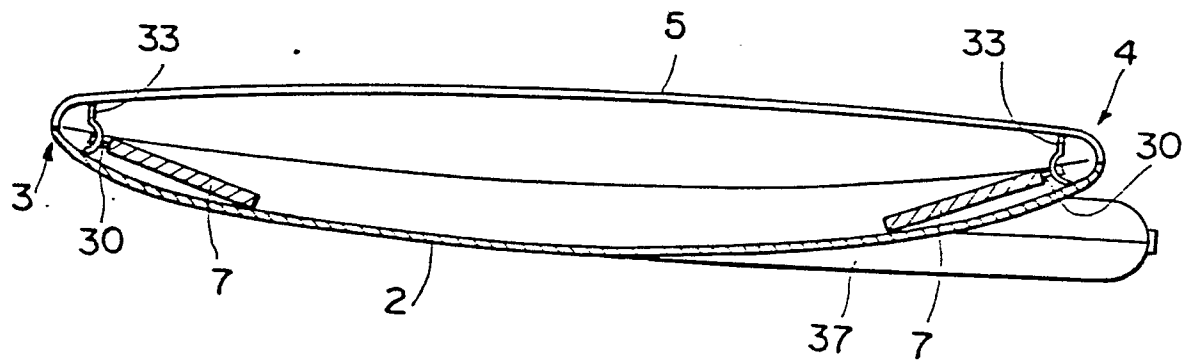


Fig. 12

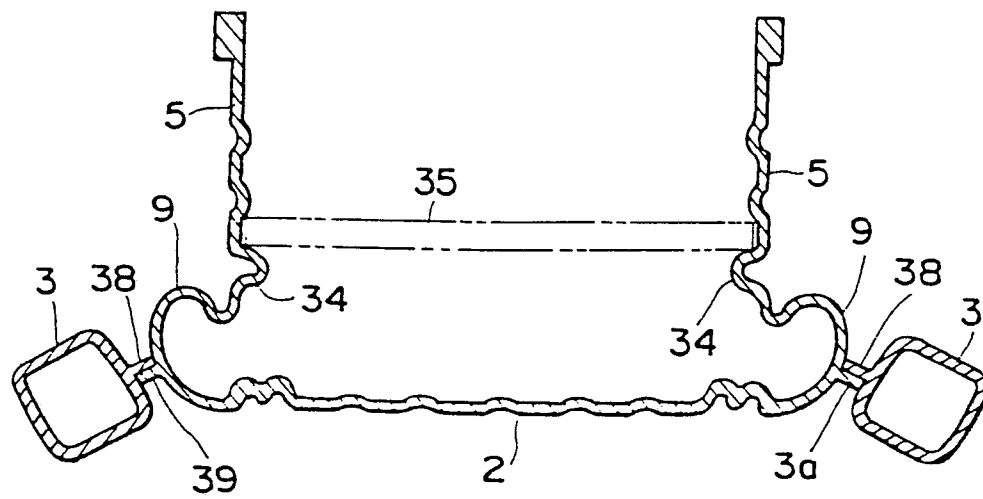


Fig. 13

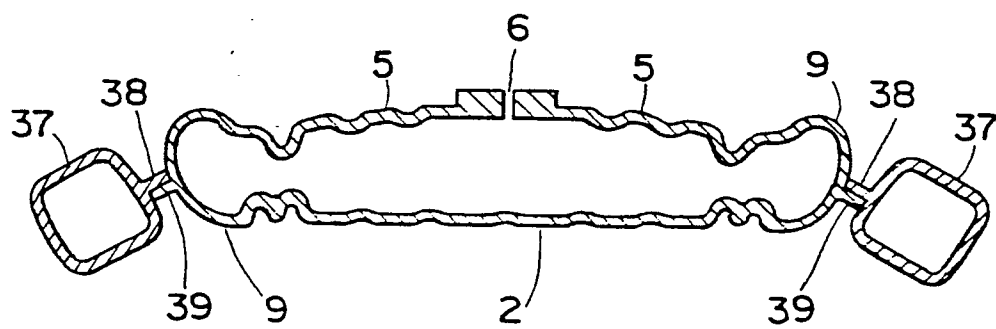


Fig. 14

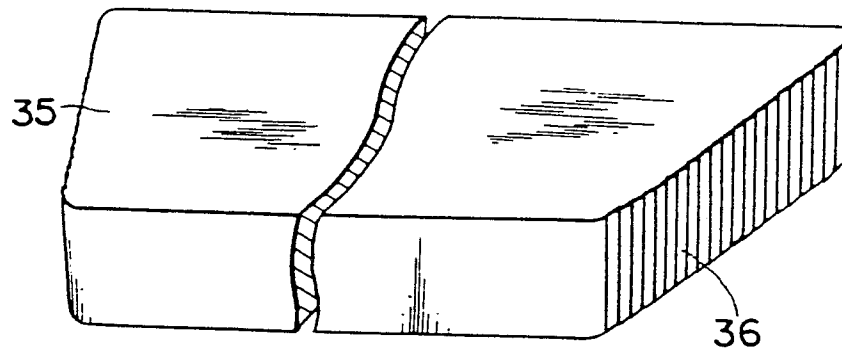


Fig. 15

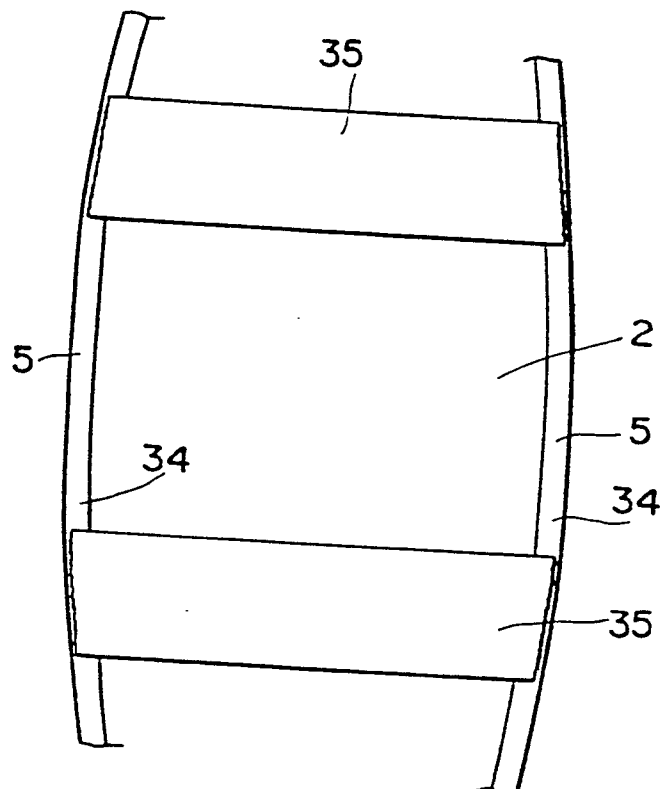


Fig. 16

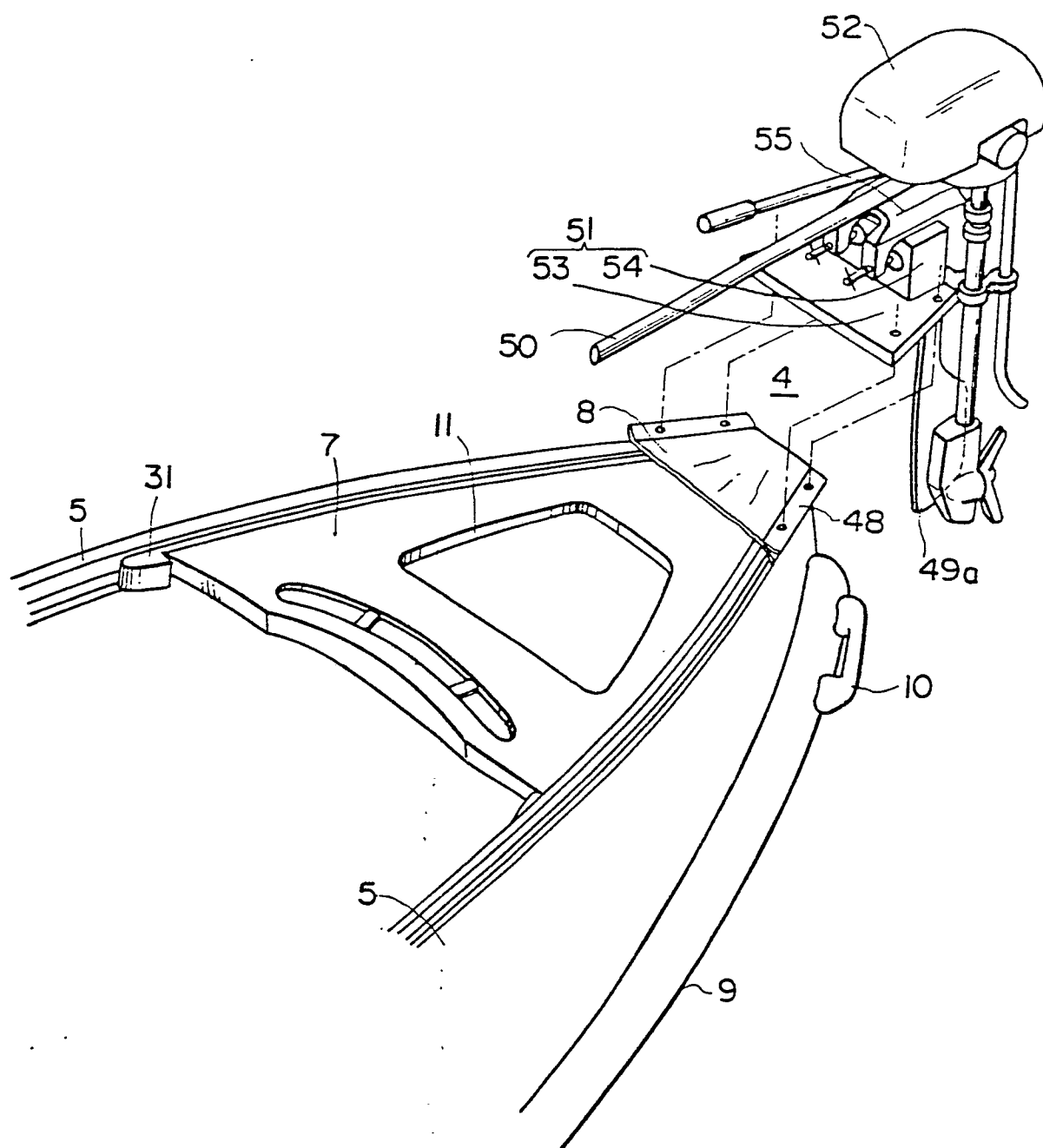


Fig. 17

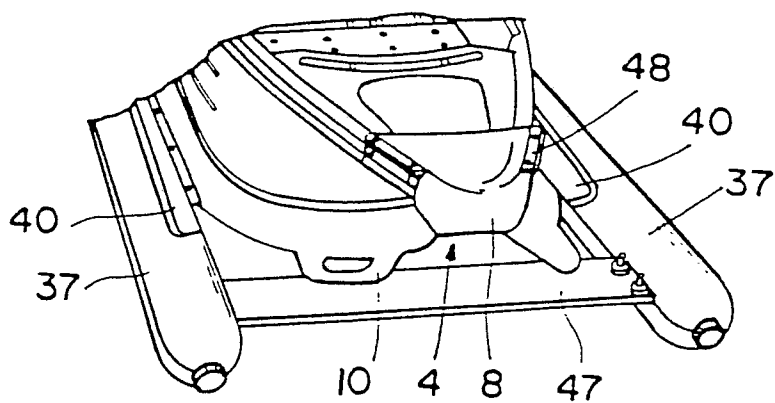


Fig. 18

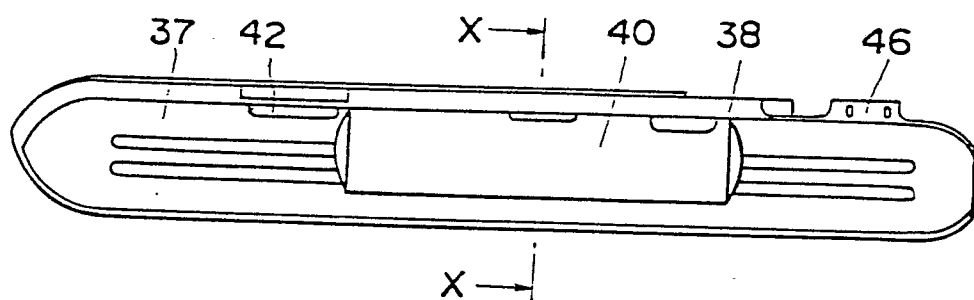


Fig. 19

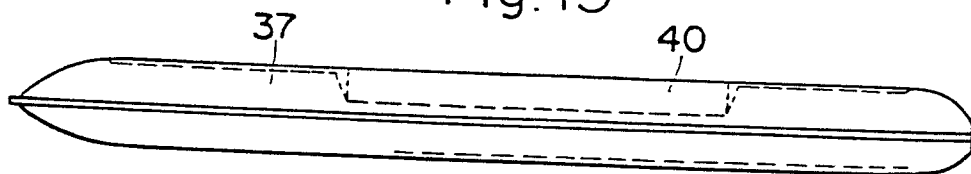


Fig. 20

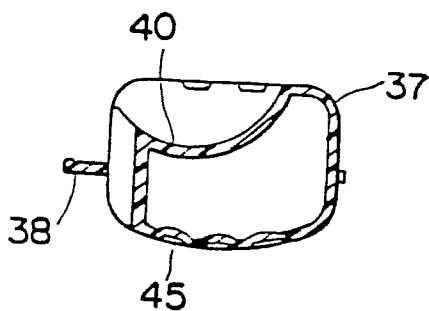


Fig 21

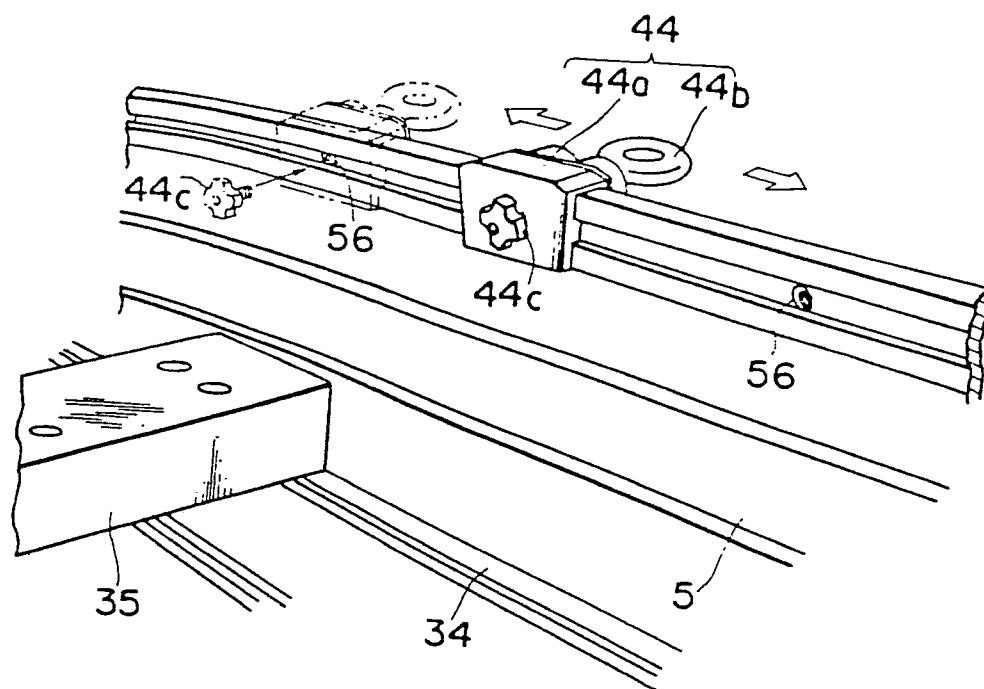


Fig. 23

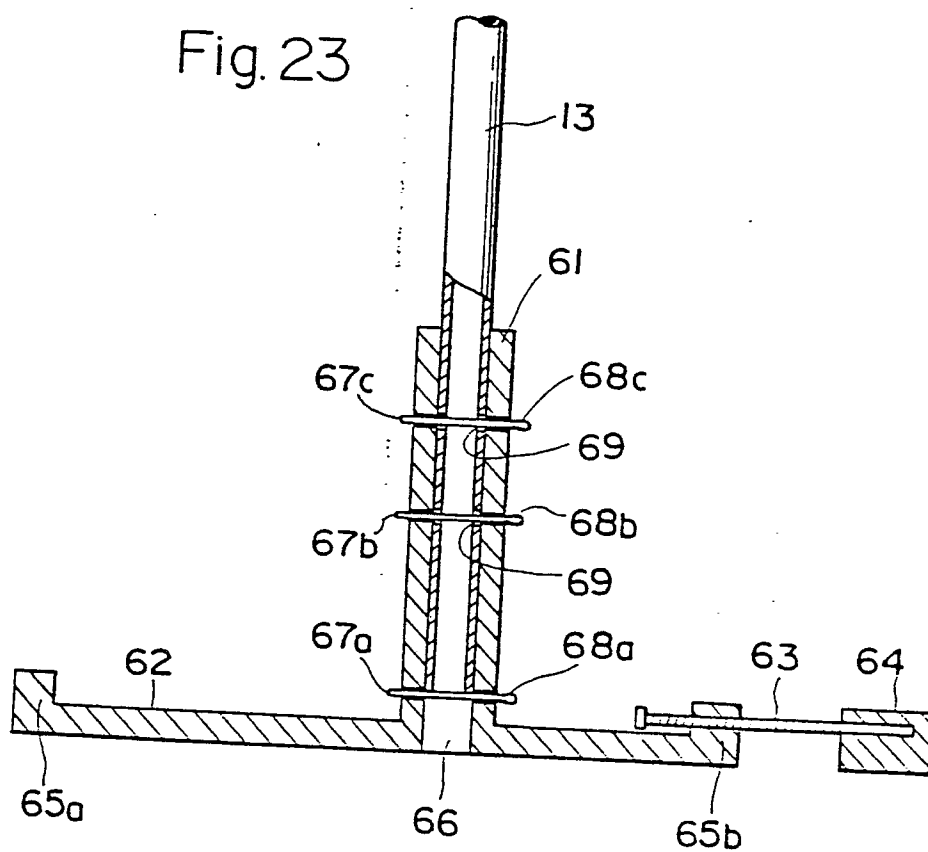
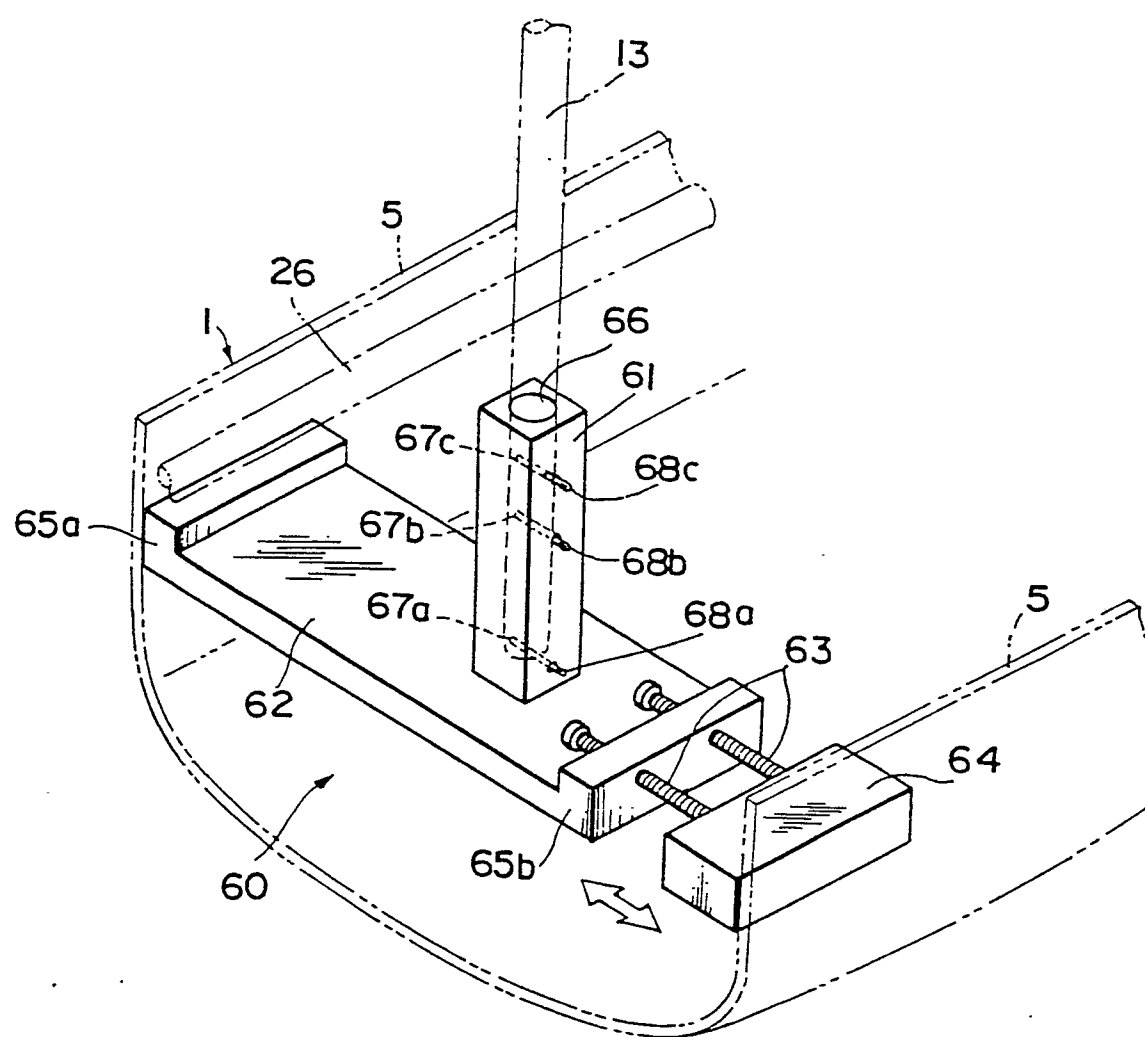


Fig. 22



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP89/00101

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl.⁴ B63B7/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC B63B7/00-7/02		
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
Jitsuyo Shinan Koho Kokai Jitsuyo Shinan Koho 1926 - 1988 1971 - 1988		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	JP, B2, 53-36676 (Tanemoto Keigo) 4 October 1978 (04. 10. 78) Column 2, lines 32 to 37 & DE, A1, 2,532,966 & GB, A, 1,512,664	1-15
A	JP, A, 57-144181 (Tanemoto Keigo) 6 September 1982 (06. 09. 82) Figs. 2, 4 (Family: none)	1-15
¹⁰ * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
March 31, 1989 (31. 03. 89)	April 17, 1989 (17. 04. 89)	
International Searching Authority	Signature of Authorized Officer	
Japanese Patent Office		